

REMARKS/ARGUMENTS

The office action of November 4, 2003 has been carefully reviewed and these remarks are responsive thereto. Reconsideration and allowance of the instant application are respectfully requested. Claims 1-23 and 27-35 remain in this application. Claims 24-26 and 36-42 have been canceled without prejudice or disclaimer.

Applicant has amended the claims to better comply with traditional U.S. style claiming format and to otherwise improve their clarity.

The application has been objected to for failing to include an abstract. Applicant provides an abstract herewith to obviate this objection. Also, applicant is submitting herewith a substitute specification to correct minor informalities and to place the application in traditional style U.S. format.

Claims 3 and 34 stand objected to based on informalities identified in the action. Applicant has amended the claims to address these informalities as well as other minor informalities.

Claims 1, 11, 13, 15, 18, 27, 28, 34 and 35 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. patent no. 4,925,294 to Geshwind et al. ("Geshwind"). Thus, the action alleges that Geshwind shows all the features of claims 1, 11, 13, 15, 18, 27, 28, 34 and 35. Applicant respectfully traverses this rejection.

Independent claim 1 is directed to a method of producing a depth map for use in the conversion of 2D images into stereoscopic images and independent claim 27 is directed to a method of encoding a depth map for use in the conversion of 2D images into stereoscopic images. In contrast, Geshwind relates to the computer assisted processing of standard 2D motion pictures to generate processed image sequences which exhibit some 3D depth effects when viewed. *Geshwind*, col. 2, lines 41-48. Thus, Geshwind describes a system in which a 2D image sequence is converted into a 3D image sequence and does not even mention a depth map. A depth map is wholly different from a 3D image sequence. A depth map, which can be referred to as a range image or Z-buffer, is a 2D array of values that is associated with a raster image. Each image pixel has an associated depth value that encodes the distance between the camera used to acquire the image and the object represented by the image pixel. The depth values form the depth

map. Tellingly, Geshwind neither teaches nor suggests producing or encoding a depth map for use in the conversion of 2D images into stereoscopic images as recited in claims 1 and 27, respectively. Indeed, applicant believes that he is the first to develop the use of depth maps in the creation of stereoscopic images. The action points to col. 3, lines 2-16 to show that Geshwind produces a depth map for use in the conversion of 2D images into stereoscopic images. Yet Geshwind, including the cited portion, is entirely devoid of any mention of depth maps, much less any teaching of producing or encoding a depth map for use in the conversion of 2D images into stereoscopic images.

Moreover, Geshwind lacks a teaching or suggestion of allocating an identifying tag to the at least one object as recited in claim 1. To allegedly show the step of allocating an identifying tag, the action relies on col. 3, lines 17-28. While Geshwind states that a human identifies individual image elements, Geshwind lacks a teaching or suggestion of allocating an *identifying tag* to the individual image elements. Nor does Geshwind suggest allocating an identifying tag to the at least one object as recited in claim 1.

For at least the aforementioned reasons, Geshwind does not provide a teaching or suggestion of every element of independent claims 1 and 27. Thus, claims 1 and 27 are patentably distinguishable from Geshwind. Claims 11, 13, 15, and 18, which ultimately depend from claim 1 and claims 28, 34 and 35, which ultimately depend from claim 27, are patentably distinct from Geshwind for the same reasons as their ultimate base claim and further in view of the additional advantageous features recited therein.

For example, the action relies on col. 7, lines 12-27 and col. 8, lines 1-5 of Geshwind to show the claim 11 feature of the depth tag including a color code. Inspection of the cited passages however reveals that Geshwind only describes colorization of 2D images and the coloring of the left and right image pair rather than providing a depth tag including a color code as called for in claim 11.

Claim 13 calls for the depth tag to be a numerical value. The action points to col. 4, lines 52-55 of Geshwind to show this feature. Yet the cited portion merely states that “[d]epth position information, in the third dimension, is determined for each image element, by a combination of

operator input and computer analysis.” Nowhere does Geshwind teach or suggest what a depth tag is, what form it takes, or that the depth position information is a numerical value.

Claim 28 recites that the object outline is defined by a series of x,y coordinates, each x,y coordinate being separated by a curve. The action alleges that this feature is inherent from the term position information discussed at col. 4, lines 23-31 of Geshwind. Significantly, Geshwind provides no teaching, suggestion, or disclosure as to what “position information” includes or even as to how the outline of an image element is indicated. For a feature to be inherent it must necessarily result; the mere possibility that the feature may result is insufficient to establish inherency.

Claims 14, 16, 17 and 23 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Geshwind, as applied to claims 1, 13 and 15. Applicant traverses this rejection.

The action rejects claim 14 as being obvious over Geshwind by taking official notice that encoding a numerical value from 0-255 is well known and combining the well known fact with Geshwind to obtain the claim 14 invention. However, the claim calls for allocating a depth tag to an object, where the depth tag is a numerical value which ranges from 0 to 255. Claim 14 does not require digital encoding and the depth tag could and for simplicity purposes probably would have taken on the name of the object. Hence, the action has engaged in impermissible hindsight in an attempt to construct the claim 14 invention. Thus, in addition to the reasons set forth with respect to claim 13, applicant submits that claim 14 is not obvious from Geshwind as one skilled in the art would not have been motivated to modify Geshwind as proposed in the action.

Regarding claims 16 and 17, the action takes official notice that using linear or radial ramp functions is well known to introduce variations in an image and then alleges that the invention of claims 16 and 17 is obvious in view of Geshwind and what is well known. However, claims 16 and 17 do not call for introducing variations in an image. Rather, the ramp function defines depth of an object which can include segments of an object. Applicant submits that it is not well known to define variation in the depth of an object using a ramp function as recited in claims 16 and 17. Thus, the inventions of claims 16 and 17 are not obvious in view of Geshwind.

Claim 23 calls for producing grayscale images of 80x60x8 bit resolution of each 2D image. The action acknowledges that Geshwind neither teaches nor suggests this feature. Nonetheless, the action contends that it would have been obvious to produce such grayscale images to satisfy specific design requirements of a particular system. However, applicant does not produce grayscale images of 80x60x8 bit resolution of each 2D image to match specific design requirements. Indeed, applicant has discovered that the resolution of the depth map does not have to match the native resolution of the associated 2D image. One skilled in the art would at most have matched the resolution of the 2D image and depth map. Thus, one skilled in the art would not have modified Geshwind as set forth in the action to obtain the claim 23 invention.

Claims 2, 5, 6, 32 and 33 stand rejected under 103(a) as being unpatentable over Geshwind, as applied to claims 1 and 27, and further in view of U.S. patent no. 4,783,829 to Miyakawa et al. ("Miyakawa"). Claim 3 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Geshwind in view of Miyakawa, as applied to claims 1 and 2, and further in view of U.S. patent no. 6,055,330 to Eleftheriadis et al. ("Eleftheriadis"). Claims 4 and 9 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Geshwind in view of Miyakawa, as applied to claims 1 and 2, and further in view of U.S. patent no. 5,640,468 to Hsu. Claims 7 and 8 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Geshwind in view of Miyakawa, as applied to claims 1 and 2, and further in view of U.S. patent no. 6,404,936 to Katayama et al. ("Katayama"). Claim 10 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Geshwind in view of Miyakawa in view of Hsu, as applied to claim 9, and further in view of Katayama. Claim 12 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Geshwind, applied to claim 11, and further in view of U.S. patent no. 5,793,900 to Nourbakhsh et al. ("Nourbakhsh"). Claims 19-22 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Geshwind, as applied to claim 1, and further in view of WO 97/04404 to Tseng et al. ("Tseng"). Claims 29 and 31 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Geshwind, as applied to claim 28, and further in view of Katayama. Claim 30 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Geshwind in view of Katayama, as applied to claims 28 and 29, and further in view of U.S. patent no. 5,511,153 to Azarbayejani et al. ("Azarbayejani"). Applicant traverses these rejections.

Applicant submits that each of Miyakawa, Katayama, Eleftheriadis, Hsu, Nourbakhsh, Tseng, and Azarbayejani alone, or in combination, fails to remedy the defects of Geshwind with respect to independent claims 1 and 27. Thus, the combination of Geshwind and any of the other applied references, even if proper, does not result in the invention of independent claims 1 and 27. Hence, for at least this reason all of the claims of the instant application are patentably distinct from the applied art. In addition, the claims 2-23 and 28-35 are considered patentably distinct over any combination of the applied art further in view of the additional advantageous features recited therein. Below, applicant will provide further specific reasons for patentability for several of the rejected dependent claims.

Contrary to the action's assertion, one skilled in the art would not have combined Geshwind with Miyakawa to obtain the invention found in any claim of the instant application. Notably, Geshwind describes that individual image elements are outlined by a human operator using a graphical input tablet and stylus to outline an object thereby forming its shape while Miyakawa describes an automatic pattern recognition process, which determines the approximate shape of an object. Geshwind has a computer CPU 50 equipped with software for interpreting the human input (col. 4, lines 34-38) to accurately represent the image elements and thus has no need for approximating any shape using the pattern recognition process of Miyakawa. Accordingly, one skilled in the art would not have been motivated to combine Geshwind and Miyakawa. Thus, applicant submits that all combinations of the applied art including Geshwind and Miyakawa are improper for at least this reason.

The action alleges that the combination of Geshwind, Miyakawa and Hsu results in the inventions of claims 4 and 9. The action relies on Hsu to show the features recited in claims 4 and 9. Assuming, but not admitting, that this combination is proper, applicant submits that Hsu does not teach or suggest that the step of identifying the at least one object occurs prior to the determining and defining step and includes the step of comparing the 2D image with a library of generic scenes as recited in amended claim 4. Instead, Hsu discloses segmenting (i.e. outlining) the object and then matching the segmented region against an image library. See e.g., Hsu, Abstract. Thus, the combination of Geshwind, Miyakawa and Hsu, even if proper, does not result in the claim 4 invention.

Claim 9 recites that the step of determining the outline further includes comparing the object with a library of curves and/or generic or geometric shapes to approximate the outline. As discussed, Hsu discloses segmenting (i.e. outlining) the object and then matching the segmented region against an image library. Necessarily, Hsu does not compare the object with a library of curves and/or generic or geometric shapes to approximate the outline in the step of determining the outline. Thus, the combination of Geshwind, Miyakawa and Hsu, even if proper, does not result in the claim 9 invention.

The action contends that the combination of Geshwind, Miyakawa and Katayama results in the inventions of claims 7 and 8. The action relies on Katayama to show the features recited in claims 7 and 8. Assuming, but not admitting, that this combination is proper, Katayama neither teaches nor suggests using curve approximations (claim 7) or Bezier curves (claim 8) to approximate the outline of the at least one object. Rather, Katayama describes correcting a contour that has been automatically extracted using contour shaping. More specifically, Katayama describes the repair of an existing contour derived automatically, and not determining the outline of an object using curve approximations or Bezier curves to approximate the outline.

Claim 10, which depends from claim 9, and has been rejected over the combination of Geshwind, Miyakawa, Hsu and Katayama, is further patentably distinct from the applied art for the same reasons discussed with respect to Hsu and claim 9 and the reasons discussed with respect to Katayama and claims 7 and 8 to the extent they apply.

Claim 19 calls for the feature of adding a texture bump to the at least one object. The action acknowledges that Geshwind does not show this feature, but relies on Tseng to show this feature alleging that the combination of Geshwind and Tseng results in the claim 19 invention. Notably, Tseng does not teach a method of identifying *objects*. Tseng discloses an encoding method where “[f]or every image point Ic' (xc,yc) there is provided a corresponding depth value $zc=Dc'$ (xc,yc)” (page 8, line 31). As such, Tseng describes depth values being assigned to image coordinates and not objects. It follows that Tseng does not add a texture map to an object as recited in claim 19. Thus, the combination of Geshwind and Tseng, even if proper, would not have resulted in the invention of claim 19 or claims 20-22, which depend from claim 19.

Moreover, with respect to claim 21, the texture bump map is defined by luminance values of individual components of an object. In contrast, the intensity values referred to by Tseng relate to image coordinates: “[A] corresponding texture map incorporating the intensity values for each coordinate is also kept” (page 9, lines 2-5). Tseng does not teach or suggest a texture bump map defined by luminance values of *individual components of an object* as recited in claim 21. Similarly, Tseng does not teach or suggest a texture bump map defined by chrominance, saturation, color grouping, reflections, shadows, focus and/or sharpness of *individual components of the at least one object* as recited in claim 22.

Claim 30, depends from claims 28 or 29, which each depend from claim 27 and recites that the object outline includes data on the orientation of each curve. To show this particular feature, the action relies on Azarbayejani (in combination with Geshwind and Katayama). Azarbayejani discloses the generation of computer models from video without prior knowledge of camera geometry etc. Applicant’s claimed invention does involve building computer models; rather it is directed to making depth maps. Azarbayejani describes the orientation of a plane that includes the (entire) polygon that defines the segmented object (column 10, lines 57-65). However, the orientation of a plane is wholly different from the orientation of each curve. Notably, by definition, a plane can only be applied to all elements of a segmented object and not each element (curve). Therefore, the combination of Geshwind, Katayama and Azarbayejani, even assuming proper, does not result in the invention of claim 30.

CONCLUSION

It is believed that no fee is required for this submission. If any fees are required or if an overpayment is made, the Commissioner is authorized to debit or credit our Deposit Account No. 19-0733, accordingly.

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All rejections having been addressed, applicants respectfully submit that the instant application is in condition for allowance, and respectfully solicit prompt notification of the same.

Respectfully submitted,

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